

## The Early Days of the Neurosciences Intensive Care Unit

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*The definition of a specialist as one who 'knows more and more about less and less' is good and true. Its truth makes essential that the specialist, to do efficient work, must have some association with others who, taken altogether, represent the whole of which the specialty is only a part.<sup>1</sup>*

Dr Charles H. Mayo

The development of critical care as a specialty and the formation of intensive care units (ICUs) have been well chronicled.<sup>2,3</sup> The history of ICUs can be approached from different angles: history of units, history of technology, history of understanding and refinements of specific critical illnesses, history of critical care treatments, and even a history of ethics in the ICU. Specialized units were needed with increasing medical and surgical specialization; surgeons were operating on sicker patients with more sophisticated procedures, necessitating a higher level of perioperative observation and care. More generally, physicians and nursing staff recognized that skilled care and increased vigilance could improve outcome.

A definitive moment was the emergence of several paralytic poliomyelitis epidemics, including in the United States.<sup>3,4</sup> In the 1950s, these epidemics resulted in a rapid expansion of ICUs across the United States. These epidemics also led to improvement in mechanical ventilation and were followed by the further characterization of multidisciplinary ICUs, trauma units, transplant units, and postoperative care units. In the early 1970s, the vast majority of large medical institutions had ICUs constructed in their hospitals.

The history of neurosciences intensive care units (NICUs) has remained fragmented and insufficiently researched. Neurosurgeon Walter Dandy has been credited with opening the first NICU at Johns Hopkins Hospital in 1932. Indeed, Dandy had the foresight to understand that some neurosurgical patients needed special care, and thus he opened a special ward dedicated to the care of the sicker postoperative neurosurgical patients. In the United Kingdom, the Batten Respiratory Unit at the Institute of Neurology and National Hospital for Nervous Diseases in London opened in 1954 to treat mostly patients with acute neuromuscular disease but also those with stroke and spinal cord disorders who required mechanical ventilation.<sup>5</sup> The beginnings of NICUs, and combined neurology and neurosurgery ICUs, are largely unknown. Many of these first units were for either neurosurgical or neurologic patients.

In a broader sense, little is known about the triage of patients with acute neurologic conditions in those days.

This vignette explores the development of the NICU in Saint Marys Hospital, Rochester, MN. We discuss the early beginnings of neurosciences intensive care and the role of the nursing division and specialty groups in the 1950s.

### THE EARLY DAYS

The "neuro unit with specialized care"<sup>6</sup> was one of the first ICUs built in Saint Marys Hospital. The idea to build a new unit in Saint Marys Hospital originated in 1955 with Sr Amadeus Klein (Figure 1), who recognized that patients with severe traumatic brain injury and those who had undergone craniotomy required very close neurologic monitoring. Sr Klein entered the convent after high school and graduated in 1950 from Saint Marys School of Nursing. After graduation, she immediately became the neuro nursing supervisor and remained in that position until 1958. An NICU was needed because patient care was becoming complex with a number of patients in need of constant supervision. Sr Klein proposed to Sr Mary Brigh Cassidy, the hospital administrator at that time, that only the sickest patients and surgical patients requiring constant postoperative monitoring could be admitted to such a unit. (Oral history of nursing, Rochester, MN. Interview of Virginia Wentzel of the nursing history committee with Sr Amadeus Klein, 1970.) Sr Klein contacted Sr Domitilla DuRocher, president of the building committee, and suggested a 12-bed unit divided into 6 double rooms with glass partitions between the rooms and a centralized desk that would allow an overview of all patients (Figure 2).

Sr Amadeus Klein remembers,

One day, I had the opportunity in fact, I was on the building committee with Sr Domitilla and various people, I had the opportunity to look at the blueprints, and I discovered that on the main floor they

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FIGURE 1. Sr Amadeus Klein.

were going to jut out the building in sort of a square shape for the emergency room...I immediately felt this would be perfect place for us to put our patients...One day Sr Domitilla approached me and said "Now sister I hear you are thinking about something for this area in neurology and neurosurgery. Could you tell me about it? (Oral history of nursing, Rochester, MN. Interview of Virginia Wentzel of the nursing history committee with Sr Amadeus Klein, 1970.)

The new NICU was located on the second floor of the Domitilla Building, just off the main neurology/neurosurgery ward, and opened in the summer of 1958. Nina Bowers, a staff nurse, became the unit nurse manager. Most of the neurosurgery initiative came through Dr Love, Chair of the Department of Neurosurgery. (Oral communications, Catherine Towey, RN, prior nurse manager of the NICU, November 18, 2010.)

The NICU was not the first unit in Saint Marys Hospital; cardiac surgery opened a Cardiac Nursing ICU a few months earlier. Although nurses in the neurosciences unit had worked diligently in designing the new ICU, because of the growing population of cardiac surgery patients, the cardiac unit opened shortly before the neuro unit. The design of the cardiac unit was copied from the NICU design but was not as compact because the needs were different.

The NICU was an "open" unit. This open concept was designed so that nurses could see any patient from any location on the unit. The organization and day-to-day management were under the direction of the nurse supervisor.<sup>6</sup> No single physician was assigned as being in charge of the administration or patient care in the NICU, and individual patient management was under the direction of the responsible neurology and neurosurgery consulting physician and resident team. On average, 2 to 3 patients of the 12-bed capacity would be undergoing ventilator treatment at any one time. The respiratory service team, directed by one of the neuroanesthesiologists, assisted with mechanical ventilation, but general medical management was the responsibility of the individual services.

Most neurosurgical patients had traumatic brain and spinal injuries or had undergone craniotomy. Most neurologic patients had severe ischemic strokes, subarachnoid and intracerebral hemorrhages, and occasionally myasthenia gravis, Guillain-Barré syndrome, and tetanus. (Oral communications, Jack P. Whisnant, MD, November 29, 2010.)

Sr Amadeus Klein remembers,

I think that neurology and neurosurgery were different from most other areas in the hospital. And I might be prejudiced in this re-



Figure 2. Design of the Neurosciences Intensive Care Unit on the second floor of the Domitilla Building, Saint Marys Hospital, Rochester, MN.

gard, but I think other supervisors and head nurses felt the same that neuro was different. We had a close unit. We kept each other informed. (Oral history of nursing, Rochester, MN. Interview of Virginia Wentzel of the nursing history committee with Sr Amadeus Klein, 1970.)

These early days were notable for the presence of specifically skilled nurses. There was instruction in the basic neurosciences and review of neuroanatomy for nursing staff. Some of the neuroanesthesiologists gave lectures on respiratory care, including safe and effective provision of oxygen. Residents in neurosurgery and neurology were taught at the bedside during daily attending staff and resident rounds. Nurses recognized early patient deteriora-

tion and provided innovative care to this new specialty in a therapeutic and skilled environment. The rehabilitation services were often consulted to assist in the use of rocking beds and of the chest respirator. At that time, use of the hypothermia blanket was also a common practice.

### RECENT EVOLUTION

As neurosurgical and neurology services grew in patient numbers as well as patient complexity, it became necessary in the 1970s to develop a second unit, which was typically used for less critical, nonventilated patients. In the late 1980s, driven by even more complexity of patient management, including use of Swan-Ganz monitoring of



pulmonary artery wedge pressures and pharmacologic manipulation of cardiac output, the Department of Neurosurgery requested the participation of a selected neuroanesthesiologist to direct cardiopulmonary management.

Patient care demands quickly exceeded the availability and capability of 1 or 2 neuroanesthesiologists, and by mutual agreement of the neuroanesthesia, neurology, neurosurgery, and critical care services, the participation of anesthesia/critical care specialists was requested to provide consultative medical management to patients with special cardiopulmonary and other medical needs. Individual neurology and neurosurgery services maintained responsibility for primary care of their respective patients in the NICU. Neurocritical care was responsible for all neurology patients in the NICU and for consultation and comanagement of neurosurgery patients beginning in 1993.

### CONCLUDING REMARKS

The NICU at Saint Marys Hospital was one of the first newly built combined neurology and neurosurgical ICUs in the United States. It started as an open unit and with predominantly neurosurgical patients. Most of the expertise was developed in the care of neurosurgical patients. However, patients with other acute neurologic disorders were admitted and managed by neurologists. Later, many of the chronic neurologic problems were triaged to the Respiratory Care Unit (the medical ICU on the third floor of the Alfred Building, Saint Marys Hospital, Rochester, MN), but most of the patients who had a major stroke, particularly those with intracranial hemorrhage, would routinely be admitted to the NICU. Parallel to these developments at Saint Marys Hospital was the growth of ICUs and the establishment of the critical care service, all under the leadership of anesthesiologist Alan Sessler. (Details of this development based on oral history have been published.<sup>7</sup>)

There are some unique considerations in revisiting these early days. First, the space was designed as an NICU and not as a rearrangement of patients in a separate ward, as was done in most other centers. There was attention to detail, especially for nursing efficiency, and close patient observation in preconstruction planning of the unit. Second, there is compelling evidence that the incentive to start the NICU began in the nursing division with support from the departments of neurosurgery and neurology. A new culture of neurosciences was nurtured with specific attention to the care of the neediest patient. Teaching of nursing staff and the beginnings of administration became part of the NICU responsibilities. The development of the NICU can clearly be seen as an out-

growth of nursing ingenuity. The role of nursing staff in the development of critical care has been underappreciated. One recent review noted that all history was written by physicians who attributed to themselves important groundbreaking roles.<sup>8</sup>

In the United States, most NICUs matured when combining neurosurgical and neurologic patients. This would seem logical because acutely ill neurologic patients could need neurosurgical intervention (eg, cerebral hematoma) and acutely ill neurosurgical patients could benefit from neurologic expertise (eg, seizure management). Because of the open nature of the NICU, physicians from multiple disciplines would closely cooperate in patient management. Participation of neurologists and neurosurgeons in those years seemed impromptu. While reconstructing this period, it became clear that the close cooperation between neurology and neurosurgery consultants in our NICU was distinctively characteristic.

After those early days, several landmark developments were noted. There was the renewed interest in describing and treating acute neurologic and neurosurgical conditions and better understanding of the risks of patient deterioration. Introduction of monitoring of intracranial pressure in the 1960s was a major step forward in understanding the pathophysiology and directing neurosurgical and medical care; however, it was slow to be widely adopted.<sup>9</sup> With the formalization of a neurocritical care service in 1993, neurointensivists became a full-time presence in the NICU, later incorporating an accredited fellowship and teaching programs. The NICU in Saint Marys Hospital also became a fertile ground for research.

A new sophisticated combined NICU opened on the eighth floor of the Mary Brigh Building in Saint Marys Hospital in 1995. The multidisciplinary approach to acutely ill neurologic and neurosurgical patients has remained omnipresent and axiomatic for Mayo Clinic.

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